BEFORE THE
PUBLIC SERVICE COMMISSION
OF SOUTH CAROLINA

DOCKET NO. 2017-292-WS

In the Matter of:

Application of Carolina Water Service,	**)**
Inc. of Rates and Charges and	**)**
Modification of Certain Terms and	**)**
Conditions for the Provision of	**)**
Water and Sewer Service	**)**

Prepared Rebuttal Testimony

of

Dylan W. D'Ascendis, CRRA, CVA
Director
ScottMadden, Inc.

On Behalf of

Carolina Water Service, Inc.

March 19, 2018

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Supporting Schedules

Introduction

Q. Please state your name, occupation, and business address.

A. My name is Dylan W. D'Ascendis and I am a Director at ScottMadden, Inc. My business address is 3000 Atrium Way, Suite 241, Mount Laurel, NJ 08054.

Q. Are you the same Dylan W. D'Ascendis who previously submitted prepared direct testimony in this proceeding?

A. Yes, I am.

Q. Have you prepared an exhibit which supports your rebuttal testimony?

A. Yes, I have. It has been marked for identification as Rebuttal Exhibit No. 1 and consists of Schedules DWD-1R through DWD-6R.

Purpose

Q. What is the purpose of this testimony?

A. The purpose of this testimony is to address certain aspects of the direct testimony of Douglas H. Carlisle, Ph.D, witness for the Office of the Regulatory Staff (ORS). Specifically, I will address Dr. Carlisle's recommended capital structure for Carolina Water Service, Inc. ("CWS" or the Company) and his opinion regarding their long-term debt cost rate; his use of multiple proxies for growth and his overall application of his Discounted Cash Flow ("DCF") Model; his application of the Capital Asset Pricing Model ("CAPM"); his application of the Comparable Earnings Model ("CEM"); and his failure to reflect the risk of CWS's relative small size in relation to the proxy group in his common equity cost rate recommendation.

Capital Structure

Q. Did Dr. Carlisle recommend the South Carolina Public Service Commission ("SC PSC" or "Commission") accept the Company's capital structure ratios?

A. Yes, he did. Dr. Carlisle recommended the Commission accept the Company's capital structure, which contains 51.89% common equity and 48.11% long-term debt.

Long-Term Debt Cost Rate

Q. What is Dr. Carlisle's recommended long-term debt cost rate?

A. Dr. Carlisle recommended the coupon rate of 6.58%, which does not include either amortization of debt or acquisition costs.

Q. Do you agree with Dr. Carlisle's recommendation?

A. No. The cost of the amortization of the note and the acquisition costs should be reflected in the long-term debt cost rate since these costs are incurred by the Company and are not recovered anywhere else in the regulatory model.

Q. What is the difference between your recommended long-term debt cost rate of 6.60% and the coupon rate of 6.58% and its effect on South Carolina ratepayers?

A. The difference is 0.02%. When applying this 0.02% to the agreed upon long-term debt ratio of 48.11%, the difference in overall rate of return (all else equal) is 0.01%. Applying the 0.01% to the requested rate base by the Company results in a dollar difference of $5,552.44.[1] The $5,552.44 cost, when spilt between the Company's 26,400 customers, equates to $0.21 per customer, per year.

[1] 0.01% x $55,524,404 = $5,552.44.

Q. Do you agree with Dr. Carlisle's refusal to adopt the ratemaking long-term debt cost rate of CWS because of its interest-only and make-whole provisions as well as higher-than normal interest rate? Please explain.

A. No, I do not. Most of the long-term debt of public utilities consist of long-term issuances without sinking fund payments or amortizing principal payments. Most of these issuances simply pay interest only while the debt is outstanding and then pay a "balloon" payment of the entire principal at maturity or when refinanced. There are some issuances, like that of CWS's parent, Utilities, Inc. ("UI") which pay interest only for a period of time and then begin to make sinking fund payments to reduce both the debt outstanding and the average term of the debt, which serves to add the 0.02% to the Notes' coupon rate of 6.58% to reflect issuance costs. Dr. Carlisle has not offered any evidence that UI's decision to issue the Series 2006-A Collateral Trust Notes was imprudent or unreasonable at the time. In fact, at the time of issue, the 6.58% coupon rate was in line with Baa utility bond yields.

Discounted Cash Flow Model (DCF)

Q. On page 6, line 14, through page 7, line 11 of his direct testimony, Dr. Carlisle discusses his use of various measures of growth for his DCF analyses. Please comment.

A. Dr. Carlisle used historical and projected measures of growth in earnings per share ("EPS"), book value per share ("BVPS"), dividends per share ("DPS"), and sales/revenue as provided by *Value Line Investment Survey* ("*Value Line*"). As discussed in my direct testimony at page 14, lines 14 through 22, it is appropriate to rely exclusively on security analysts' forecasted growth rates in EPS. While Dr. Carlisle did note that his approach

recognizes the importance of analyst projections,[2] it does not appear that Dr. Carlisle relied on any security analyst projections in his DCF analysis. In recent rate cases involving CWS (Dockets 2015-199-WS and 2013-275-WS), Dr. Carlisle did indeed include security analyst growth forecasts for EPS growth from services such as Zacks, Yahoo! Finance, and Reuters in his DCF analysis in addition to his *Value Line* data.

Q. Is there academic literature that supports your exclusive use of analysts' estimates in your DCF analysis?

A. Yes. Earnings expectations have a significant influence on market prices and the "appreciation" or "growth" experienced by investors. Myron Gordon, the "father" of the standard regulatory version of the DCF model, recognized the significance of analysts' forecasts of growth in EPS in a speech he gave in March 1990 before the Institute for Quantitative Research and Finance. He said:

> We have seen that earnings and growth estimates by security analysts were found by Malkiel and Cragg to be superior to data obtained from financial statements for the explanation of variation in price among common stocks ... estimates by security analysts available from sources such as IBES are far superior to the data available to Malkiel and Cragg. Eq (7) is not as elegant as Eq (4), but it has a good deal more intuitive appeal. It says that investors buy earnings, but what they will pay for a dollar of earnings increases with the extent to which the earnings are reflected in the dividend or in appreciation through growth.

Professor Gordon recognized that total return is largely affected by the terminal price, which is mostly affected by earnings (hence price / earnings multiples).

In addition, Morin notes[3]:

> Because of the dominance of institutional investors and their influence on individual investors, analysts' forecasts of long-run growth rates provide a sound basis for estimating required returns. Financial analysts exert a

[2] Carlisle Direct Testimony, p. 7, lines 12-16.

[3] Roger A. Morin, New Regulatory Finance (Public Utilities Reports, Inc., 2006), p. 298. ("Morin")

> strong influence on the expectations of many investors who do not possess the resources to make their own forecasts, that is, they are a cause of g. The accuracy of these forecasts in the sense of whether they turn out to be correct is not at issue here, as long as they reflect widely held expectations. As long as the forecasts are typical and/or influential in that they are consistent with current stock price levels, they are relevant. The use of analysts' forecasts in the DCF model is sometimes denounced on the grounds that it is difficult to forecast earnings and dividends for only one year, let alone for longer time periods. This objection is unfounded, however, because it is present investor expectations that are being priced; it is the consensus forecast that is embedded in price and therefore in required return, and not the future as it will turn out to be.
>
> * * *
>
> Published studies in the academic literature demonstrate that growth forecasts made by security analysts represent an appropriate source of DCF growth rates, are reasonable indicators of investor expectations and are more accurate than forecasts based on historical growth. These studies show that investors rely on analysts' forecasts to a greater extent than on historic data only.

Studies performed by Cragg and Malkiel[4] demonstrate that analysts' forecasts are superior to historical growth rate extrapolations. Some question the accuracy of analysts' forecasts of EPS growth, however, it does not really matter what the level of accuracy of those analysts' forecasts is well after the fact. What is important is that they reflect widely held expectations influencing investors at the time they make their pricing decisions and hence the market prices they pay.

In addition, Jeremy J. Siegel also supports the use of security analysts' EPS growth forecasts when he states[5]:

> For the equity holder, the source of future cash flows is the earnings of firms. (p.

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4 Cragg, John G. and Malkiel, Burton G., Expectations and the Structure of Share Prices (University of Chicago Press, 1982), Chapter 4.

5 Jeremy J. Siegel, Stocks for the Long Run – The Definitive Guide to Financial Market Returns and Long-Term Investment Strategies, McGraw-Hill 2002, pp. 90-94.

90)

* * *

> Some people argue that shareholders most value stocks' cash dividends. But this is not necessarily true. (p. 91)

* * *

> Since the price of a stock depends primarily on the present discounted value of all expected future dividends, it appears that dividend policy is crucial to determining the value of the stock. However, this is not generally true. (p. 92)

* * *

> Since stock prices are the present value of future dividends, it would seem natural to assume that economic growth would be an important factor influencing future dividends and hence stock prices. However, this is not necessarily so. The determinants of stock prices are earnings and dividends on a *per-share* basis. Although economic growth may influence *aggregate* earnings and dividends favorably, economic growth does not necessarily increase the growth of per-share earnings of dividends. It is earnings per share (EPS) that is important to Wall Street because per-share data, not aggregate earnings or dividends, are the basis of investor returns. (italics in original) (pp. 93-94)

Investors are also aware of the accuracy of past forecasts, whether for EPS or DPS growth, or for interest rate levels. Investors have no prior knowledge of the accuracy of any forecasts available at the time they make their investment decisions, as that accuracy only becomes known after some future period of time has elapsed. Therefore, given the overwhelming academic/empirical support regarding the superiority of security analysts' EPS growth rate forecasts, such EPS growth rate projections should be relied upon in a cost of common equity analysis.

Since investors have such analysts' earnings growth rate projections available to them, and investors are aware of the superiority of such projections, analysts' projections of EPS growth should receive significant, if not exclusive, weight in a DCF analysis.

Q. What would Dr. Carlisle's DCF result have been had he correctly relied upon security analysts' forecasted growth in EPS?

A. As shown on Schedule DWD-1R, using the average dividend yield for Dr. Carlisle's water proxy group, 2.11% (from Exhibit DHC-9) and the average forecasted growth in EPS of 7.31%,[6] an indicated common equity cost rate of 9.50% results.[7] The DCF result for Dr. Carlisle's proxy group using just the projected EPS growth rate from *Value Line* is 11.01%.[8]

Capital Asset Pricing Model (CAPM) Analysis

Q. Do you have any comment on Dr. Carlisle's application of the CAPM?

A. Yes. Dr. Carlisle's application of the CAPM has several flaws: first, his calculation of the R_m, or return on the market, is incorrectly derived; second, his use of the geometric mean is not valid for cost of capital purposes; and finally, Dr. Carlisle fails to use the Empirical CAPM ("ECAPM") in his analysis.

Q. Please explain how Dr. Carlisle miscalculated the return on the market in his CAPM analysis.

A. Dr. Carlisle miscalculated the market return in both of his calculations: his first market return calculation simply averages the returns by decile[9] to derive his average return of 11.27%. His second market return calculation weights the decile returns by the number of companies in each decile,[10] which results in an 11.70% market return. Both of these calculations are incorrect, because they produce higher than expected results due to the higher returns of smaller companies, which are weighted more heavily. The correct number to use is found at the bottom of the chart shown on page 7-13 under "The

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6 For the corrected growth rate, I supplemented Dr. Carlisle's projected growth rate in EPS from Value Line (8.72%) with security analyst projected EPS growth rates from Zacks (6.79%) and Yahoo! Finance (6.43%). I chose these two investment services because Dr. Carlisle relied in part on their forecasts in both Dockets 2015-199-WS and 2013-275-WS.

7 9.57% = 2.11% x (1 + 7.31%) + 7.31%.

"Market" (Deciles 1-10)" of 9.8%.[11] Nevertheless, because this is a geometric return, or a compound annual growth rate, it is not appropriate for cost of capital purposes.

Q. Why is the geometric mean not appropriate for cost of capital purposes?

A. As I stated in my direct testimony at page 20, lines 8 through 17,

> I used the arithmetic mean monthly total return rates for the large company stocks and yields (income returns) for the Moody's Aaa/Aa corporate bonds, because they are appropriate for the purpose of estimating the cost of capital as noted in SBBI – 2017.(footnote omitted) The use of the arithmetic mean return rates and yields is appropriate because historical total returns and equity risk premiums provide insight into the variance and standard deviation of returns needed by investors in estimating future risk when making a current investment. If investors relied on the geometric mean of historical equity risk premiums, they would have no insight into the potential variance of future returns because the geometric mean relates the change over many periods to a constant rate of change, thereby obviating the year-to-year fluctuations, or variance, which is critical to risk analysis.

Additionally, SBBI-2017 states:[12]

> For use as the expected equity risk premium in either the CAPM or the building block approach, the arithmetic mean, or the simple difference of the arithmetic means of stock market returns and riskless rates is the relevant number.

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8 11.01% = 2.11% x (1 + 8.72%) + 8.72%.

9 Roger G. Ibbotson and Duff & Phelps, 2017 SBBI Yearbook: Stocks, Bonds, Bills, and Inflation 1926-2016, Morningstar, Inc., p. 7-13. ("SBBI-2017")

10 *Ibid.*, p. 7-3.

11 *Ibid.*

12 *Ibid.*, p. 10-22

Q. Is there additional documentation in the academic literature that supports the arithmetic mean, or simple average, as the only mean appropriate for cost of capital analysis?

A. Yes. The financial literature is quite clear on this point. Risk is measured by the variability of expected returns, i.e. the probability distribution of returns. As noted above, the arithmetic mean calculated over a very long period of time is the correct mean to use when estimating the cost of capital.

Weston and Brigham[13] provide the standard financial textbook definition of the riskiness of an asset when they state:

> The riskiness of an asset is defined in terms of the likely variability of future returns from the asset. (emphasis added)

Morin[14] states:

> The geometric mean answers the question of what constant return you would have to achieve in each year to have your investment growth match the return achieved by the stock market. The arithmetic mean answers the question of what growth rate is the best estimate of the future amount of money that will be produced by continually reinvesting in the stock market. It is the rate of return which, compounded over multiple periods, gives the mean of the probability distribution of ending wealth. (emphasis added)

In addition, Brealey and Myers[15] note:

> The proper uses of arithmetic and compound rates of return from past investments are often misunderstood... Thus, the arithmetic average of the returns correctly measures the opportunity cost of capital for investments... *Moral*: If the cost of capital is estimated from historical returns or risk premiums, use arithmetic averages, not compound annual rates of return. (italics in original)

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13 J. Fred Weston and Eugene F. Brigham, Essentials of Managerial Finance, 3rd Ed. (The Dryden Press, 1974), p. 272.

14 Morin, p. 133.

15 Richard A. Brealey and Stewart C. Myers, Principles of Corporate Finance (McGraw-Hill Publications, Inc., 1996), pp. 146-147.

As noted above, investors gain insight into relative riskiness by analyzing expected future variability. Even more simply, using the geometric mean to estimate the equity risk premium is tantamount to reading the first and last page of a world history book and presuming to know what happened during the course of human events. Consequently, Dr. Carlisle should have relied on the arithmetic market return of 11.8% shown on page 7-13 of the SBBI-2017.

Q. Dr. Carlisle neglected to include an ECAPM in his analysis. Please comment.

A. Numerous tests of the CAPM have measured the extent to which security returns and betas are related as predicted by the CAPM confirming its validity. However, Morin observes that while the results of these tests support the notion that beta is related to security returns, the empirical Security Market Line ("SML") described by the CAPM formula is not as steeply sloped as the predicted SML. Morin[16] states:

> With few exceptions, the empirical studies agree that … low-beta securities earn returns somewhat higher than the CAPM would predict, and high-beta securities earn less than predicted.
>
> * * *
>
> Therefore, the empirical evidence suggests that the expected return on a security is related to its risk by the following approximation:
>
> $$K = R_F + x\,\beta(R_M - R_F) + (1-x)\,\beta(R_M - R_F)$$
>
> where x is a fraction to be determined empirically. The value of x that best explains the observed relationship Return = 0.0829 + 0.0520 β is between 0.25 and 0.30. If x = 0.25, the equation becomes:
>
> $$K = R_F + 0.25(R_M - R_F) + 0.75\,\beta(R_M - R_F)$$[17]

[16] Morin, p. 175.

[17] Morin, p. 190.

In view of theory and practical research, both the traditional CAPM and the ECAPM should be used.

Q. What would be Dr. Carlisle's indicated common equity cost rate based on the CAPM if he had correctly used the arithmetic mean market return and employed the ECAPM?

A. As shown on Schedule DWD-2R, using the arithmetic mean market return and employing the ECAPM to Dr. Carlisle's water proxy group, results in an indicated common equity cost rate of 10.03%.

Comparable Earnings Model (CEM)

Q. Please comment on Dr. Carlisle's selection of comparable companies for his comparable earnings model.

A. Based on Dr. Carlisle's discussion starting on line 1 of page 10 and ending on line 2 of page 11 of his direct testimony, he uses the range of betas within his water proxy group to select his non-regulated proxy group. This is not a set of criteria that would result in a group of companies comparable in total risk to his proxy group of water companies as it encompasses only one measure of risk, beta, a measure of systematic, or market risk. Moreover, beta measures only a small percentage of the total risk of a particular company as measured by the coefficient of determination, or R-Squared. As shown on Schedule DWD-3R, the average R-Squared statistic of Dr. Carlisle's water proxy group is 0.1320, which means that only 13.20% of the total risk of Dr. Carlisle's utility proxy group is explained by beta (systematic risk) where the other 86.80% is explained by non-systematic risk.

My selection criteria of non-regulated companies is more robust than Dr. Carlisle's because it reflects both unsystematic risk and systematic risk, measured by the standard errors of the regression and unadjusted betas, respectively. If the collective standard errors of the regressions and average betas of the group of non-price regulated companies chosen as a proxy for the eight water companies are similar, then the total, or aggregate, combined systematic and unsystematic risks are similar as noted in "Comparable Earnings: New Life for an Old Precept" provided in Schedule DWD-4R.

> Our selection criteria are based upon measures of systematic and unsystematic risk, specifically unadjusted beta and residual standard error. They provide the basis for the objective selection of comparable non-utility firms…We compare the aggregate total risk, or the sum of systematic and unsystematic risk, which reflects investor's aggregate assessment of both business and financial risk.
>
> It is, after all, total risk which is reflected in market prices which the comparable risk, non-price regulated, companies were selected.

Q. Have you selected a comparable non-price regulated group of companies based on the ranges of unadjusted beta and the standard error of the regression of Dr. Carlisle's water proxy group?

A. Yes, I have. As shown on Schedule DWD-5R, I have selected a proxy group of twelve non-price regulated companies that are comparable in systematic (measured by the unadjusted beta) and non-systematic (as measured by the standard error of the regression) risk as his water proxy group.

Q. The results of Dr. Carlisle's CEM analysis are based on mean book value growth but his utility proxy group recommendation is based on market-based models. Does that show an inherent inconsistency in the application of the CEM compared his other models?

A. Yes. Dr. Carlisle is comparing apples and oranges when he compares the book value growth of his non-regulated proxy group to the market-based results for his utility proxy group because growth in book value by itself is not a valid measure of the investor-required return. Dr. Carlisle implicitly agrees with the previous statement through his use of similar book value growth in his DCF analysis, as shown on Exhibits DHC-6 and DHC-9. If he used only book value growth to measure the investor-required return of his water proxy group, his results would have ranged between 4.33% and 5.21% based on the book value growth rates shown in Exhibit DHC-6. The easiest way to correct this error would be to perform DCF and CAPM analyses on his non-regulated proxy group.

Q. Have you applied the DCF and CAPM to Dr. Carlisle's amended non-regulated group?

A. Yes, I have. As shown on page 2 of Schedule DWD-6R, the DCF result for Dr. Carlisle's non-regulated group is 14.66%. On page 3 of Schedule DWD-6R, the CAPM result is 9.85%. The average of the DCF and CAPM results is 12.26%. For the application of the DCF and CAPM, I calculated the models based on the corrected versions of Dr. Carlisle's models, which include the following adjustments:

<u>DCF Analysis</u>

- Reliance on only projected EPS growth rates from *Value Line*,
- Supplementing the projected EPS growth rates from *Value Line* with analyst forecasts from Zacks and Yahoo! Finance, and

CAPM Analysis

- Using the arithmetic mean return on the market and
- Employing the ECAPM.

Q. What would be Dr. Carlisle's corrected indicated range of common equity cost rates?

A. It would be from 9.50% (DCF) to 12.26% (CEM) with the CAPM result of 10.03% falling within that range. The average of the three models is 10.60%, which should be noted is within my cost of common equity range. However, this cost rate mis-specifies the common equity cost for CWS as it does not reflect CWS's greater relative risk due to its small size. Please see Table 1, below for Dr. Carlisle's original and corrected results.

Table 1: Dr. Carlisle's Cost of Common Equity Model Results

Model	Original Result[18]	Corrected Result
Discounted Cash Flow	8.68%	9.50%
Comparable Earnings Model	8.89%	12.26%
Capital Asset Pricing Model	9.54%	10.03%
Average	9.04%	10.60%

Size Adjustment

Q. Does Dr. Carlisle's corrected common equity cost rate of 10.60% adequately reflect the risk of CWS's small size relative to the nine water companies?

A. No. As stated at pages 33 through 36 of my direct testimony, smaller companies tend to be riskier, causing investors to expect greater returns as compensation for that risk, consistent with the basic financial principle of risk and return. Another basic financial principle is that it is the use of the funds invested and not the source of those funds which

[18] Carlisle direct testimony, p. 2.

gives rise to the risk of any investment. Since CWS is the regulated utility to whose jurisdictional rate base the overall cost of capital allowed by the Commission in this proceeding will be applied, the relevant risk reflected in the cost of capital must be that of CWS, including the impact of its small size on common equity cost rate.

Q. What is the size-adjusted, corrected common equity cost rate indicated for Dr. Carlisle's water proxy group?

A. When a size adjustment of 0.50%[19] is added to Dr. Carlisle's corrected indicated common equity cost rate of 10.60% discussed above, an ROE of 11.10% results. This ROE falls slightly above my range of common equity cost rates presented in my direct testimony.

Q. Does that conclude your rebuttal testimony?

A. Yes.

[19] From Schedule DWD-1, page 2, line 6.

Exhibit No. __
Schedule DWD-1R

Carolina Water Service, Inc.
Corrected DCF Cost Rate Reflecting only Expected Growth in Earnings per Share

Company	VL Projected EPS Growth (1) 2017	Estimate	Growth	Zacks LT EPS Growth	Yahoo! Finance LT EPS Growth	Dividend Yield (2)
American States	$ 1.85	$ 2.35	7.07%	5.00%	4.00%	1.90%
American Water	3.00	4.15	9.71%	7.50%	8.20%	2.00%
Aqua America	1.36	1.85	9.19%	6.00%	5.00%	2.20%
Artesian Resources	NA	1.24	5.16%	NA	4.00%	2.50%
Calidornia Water	1.40	1.85	8.29%	6.00%	9.80%	1.60%
Connecticut Water	2.20	2.90	8.21%	6.00%	6.00%	2.10%
Global Water Resources	N/A	N/A	N/A	15.00%	15.00%	3.10%
Middlesex Water	1.40	2.10	12.28%	NA	2.70%	2.30%
SJW	2.60	3.45	8.42%	NA	14.00%	1.40%
York Water	1.05	1.60	12.79%	NA	4.90%	2.00%
		Mean	9.01%	7.58%	7.36%	2.11%
		Median	8.42%	6.00%	5.50%	
		Average	8.72%	6.79%	6.43%	

Growth Rate (3)	7.31%
Dividend Yield	2.11%
Adjusted Dividend Yield (4)	0.15%
Indicated DCF Cost of Equity	9.57%

NA = Not Available

Notes:
(1) From Revised Exhibit DHC-5, pages 2 and 3.
(2) From Revised Exhibit DHC-9.
(3) Average of *Value Line* , Zacks, and Yahoo! Finance growth rates.
(4) Growth rate multiplied by the dividend yield.

Carolina Water Service, Inc.
Corrected CAPM Reflecting the Long-Term Arithmetic Mean
Market Return and Application of the ECAPM

Line No.		
1.	Market Return (1)	11.80%
2.	Risk-Free Rate (2)	3.70%
3.	Equity Risk Premium (3)	8.10%
4.	Beta (4)	0.75
5.	CAPM Cost of Equity (5)	9.78%
6.	ECAPM Cost of Equity (6)	10.28%
7.	Average	10.03%

Notes:
(1) From page 7-13 of SBBI - 2017.
(2) From Revised Exhibit DHC-2.
(3) Line 1 - Line 2.
(4) From Revised Exhibit DHC-13, page 1.
(5) Line 2 + (Line 3 x Line 4).
(6) Line 2 + (0.75 x (Line 3 x Line 4)) + (0.25 x Line 3).

Carolina Water Service, Inc.
R-Squared Statistics for
Dr. Carlisle's Water Proxy Group

Company	R-Squared
American States	0.1292
American Water	0.1525
Aqua America	0.1702
Artesian Resources	0.0547
Calidornia Water	0.1732
Connecticut Water	0.1073
Global Water Resources	NA
Middlesex Water	0.1439
SJW	0.1206
York Water	0.1366
Average	0.1320
Median	0.1366

NA = Not Available

Source of Information:
Value Line Proprietary Database December 2017

FINANCIAL QUARTERLY
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Comparable Earnings: New Life for an Old Precept

by
Frank J. Hanley
Pauline M. Ahern

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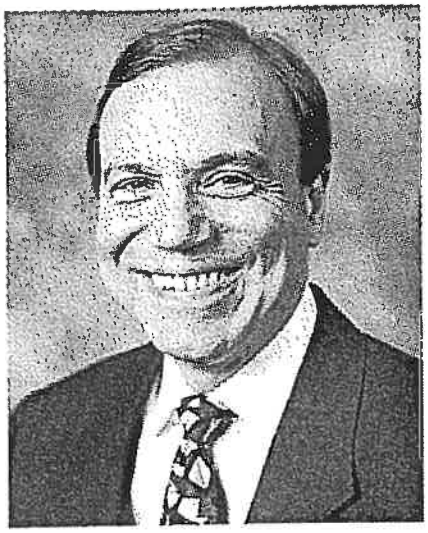
Summer 1994 edition, Arlington, Va.

Comparable Earnings: New Life for an Old Precept



Accelerating deregulation has greatly increased the investment risk of natural gas utilities. As a result, the authors believe it more appropriate than ever to employ the comparable earnings model. We believe our application of the model overcomes the greatest traditional objection to it — lack of comparability of the selected non-utility proxy firms. Our illustration focuses on a target gas pipeline company with a beta of 0.96 — almost equal to the market's beta of 1.00.

Frank J. Hanley is president of AUS Consultants — Utility Services Group. He has testified in several hundred rate proceedings on the subject of cost of capital before the Federal Energy Regulatory Commission and 27 state regulatory commissions. Before joining AUS in 1971, he was an assistant treasurer of a number of operating companies in the American Water Works System, as well as a financial planning officer with the Philadelphia National Bank. He is a Certified Rate of Return Analyst.

Pauline M. Ahern is a senior financial analyst with AUS Consultants — Utility Services Group. She has participated in many cost-of-capital studies. A former employee of the U.S. Department of the Treasury and the Federal Reserve Bank of Boston, she holds an MBA degree from Rutgers University and is a Certified Rate of Return Analyst.

Introduction

The comparable earnings model used to determine a common equity cost rate is deeply rooted in the standard of "corresponding risk" enunciated in the landmark *Bluefield* and *Hope* decisions of the U.S. Supreme Court.[1] With such solid grounding in the foundations of rate of return regulation, comparable earnings should be accepted as a principal model, along with the currently popular market-based models, provided that its most common criticism, non-comparability of the proxy companies, is overcome.

Our comparable earnings model overcomes the non-comparability issue of the non-utility firms selected as a proxy for the target utility, in this example, a gas pipeline company. We should note that in the absence of common stock prices for the target utility (as with a wholly-owned subsidiary), it is appropriate to use the average of a proxy group of similar risk gas pipeline companies whose common stocks are actively traded. As we will demonstrate, our selection process results in a group of domestic, non-utility firms that is comparable in total risk, the sum of business and financial risk, which reflects both non-diversifiable systematic, or market, risk as well as diversifiable unsystematic, or firm-specific, risk.

Embedded in the Landmark Decisions

As stated in *Bluefield* in 1922: "A public utility is entitled to such rates as will permit it to earn a return ... on investments in other business undertakings which are attended by corresponding risks and uncertainties ..."

In addition, the court stated in *Hope* in 1944: "By that standard the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks."

Thus, the "corresponding risk" precept of *Bluefield* and *Hope* predates the use of such market-based cost-of-equity models as the Discounted Cash Flow (DCF) and Capital Asset Pricing (CAPM), which were developed later and are currently popular in rate-base/rate-of-return regulation. Consequently, the comparable earnings model has a longer regulatory and judicial history. However, it has far greater relevance now than ever before in its history because significant deregulation has substantially increased natural gas utilities' investment risk to a level similar to that of non-utility firms. As a result, it is

Comparable Earnings *from page 4*

more important than ever to look to similar-risk non-utility firms for insight into common equity cost rate, especially in view of the deficiencies inherent in the currently popular market-based cost of common equity models, particularly the DCF model.

Despite the fact that the landmark decisions are still regarded as having set the standards for determining a fair rate of return, the comparable earnings model has experienced decreased usage by expert witnesses, as well as less regulatory acceptance over the years. We believe the decline in the popularity of the comparable earnings model, in large measure, is attributable to the difficulty of selecting non-utility proxy firms that regulators will accept as comparable to the target utility. Regulatory acceptance is difficult to gain when the selection process is arbitrary. Our application of the model is objective and consistent with fundamental financial tenets.

Principles of Comparable Earnings

Regulation is a substitute for the competition of the marketplace. Moreover, regulated public utilities compete in the capital markets with all firms, including unregulated non-utilities. The comparable earnings model is based upon the opportunity cost principle; i.e., that the true cost of an investment is the return that could have been earned on the next best available alternative investment of similar risk. Consequently, the comparable earnings model is consistent with regulatory and financial principles, as it is a surrogate for the competition of the marketplace, and investors seek the greatest available rate of return for bearing similar risk.

The selection of comparable firms is the most difficult step in applying the comparable earnings model, as noted by Phillips[2] as well as by Bonbright, Danielsen and Kamerschen.[3] The selection of non-utility proxy firms should result in a sufficiently broad-based group in order to minimize the effect of company-specific aberrations. However, if the selection process is arbitrary, it likely would result in a proxy group that is too broad-based, such as the Standard & Poor's 500 Composite Index or the Value Line Industrial Composite. The use of such groups would require subjective adjustments to the comparable earnings results to reflect risk differences between the group(s) and the target utility, a gas pipeline company in this example.

Authors' Selection Criteria

We base the selection of comparable non-utility firms on market-based, objective, quantitative measures of risk resulting from market prices that subsume investors' assessments of all elements of risk. Thus, our approach is based upon the principle of risk and return; namely, that firms of comparable risk should be expected to earn comparable returns. It is also consistent with the "corresponding risk" standard established in *Bluefield* and *Hope*. We measure total investment risk as the sum of non-diversifiable systematic and diversifiable unsystematic risk. We use the unadjusted beta as a measure of systematic risk and the standard error of the estimate (residual standard error) as a measure of unsystematic risk. Both the unadjusted beta and the residual standard error are derived from a regression of the target utility's security returns relative to the market's returns, which takes the general form:

$$r_{it} = a_i + b_i r_{mt} + e_{it}$$

where:

- r_{it} = ith observation of the ith utility's rate of return
- r_{mt} = ith observation of the market's rate of return
- e_{it} = ith random error term
- a_i = constant least-squares regression coefficient
- b_i = least-squares regression slope coefficient, the unadjusted beta.

As shown by Francis,[4] the total variation or risk of a firm's return, Var (r_i), comes from two sources:

Var (r_i) = total risk of ith asset
= var($a_i + b_i r_m + e$)
substituting ($a_i + b_i r_m + e$) for r_i
= var($b_i r_m$) + var (e) since var(a_i) = 0
= b_i^2 var(r_m) + var (e) since var($b_i r_m$) = b_i^2 var(r_m)
= systematic + unsystematic risk

Francis[5] also notes: "The term $\sigma^2(r_i|r_m)$ is called the *residual variance around the regression line* in statistical terms or *unsystematic risk* in capital market theory language. $\sigma^2 (r_i|r_m)$ = ... = var (e). The residual variance is the squared standard error in regression language, a measure of unsystematic risk." Application of these criteria results in a group of non-utility firms whose average total investment risk is indeed comparable to that of the target gas pipeline.

As a measure of systematic risk, we use the Value Line unadjusted beta. Beta measures the extent to which market-wide or macro-economic events affect a firm's stock price. We use the unadjusted beta of the target utility as a starting point because it results from the regression of the target utility's security returns relative to the market's returns. Thus, the resulting standard deviation of beta relates to the unadjusted beta. We use the standard deviation of the unadjusted beta to determine the range around it as the selection criterion based on systematic risk.

We use the residual standard error of the regression as a measure of unsystematic risk. The residual standard error reflects the extent to which events specific to the firm's operations affect a firm's stock price. Thus, it is a measure of diversifiable, unsystematic, firm-specific risk.

An Illustration of Authors' Approach

Step One: We begin our approach by establishing the selection criteria as a range of both unadjusted beta and residual standard error of the target gas

continued on page 6

Comparable Earnings *from page 5*

pipeline company.

As shown in table 1, our target gas pipeline company has a Value Line unadjusted beta of 0.90, whose standard deviation is 0.1250. The selection criterion range of unadjusted beta is the unadjusted beta plus (+) and minus (-) three of its standard deviations. By using three standard deviations, 99.73 percent of the comparable unadjusted betas is captured.

Three standard deviations of the target utility's unadjusted beta equals 0.38 (0.1250 x 3 = 0.3750, rounded to 0.38). Consequently, the range of unadjusted betas to be used as a selection criteria is 0.52 - 1.28 (0.52 = 0.90 - 0.38) and (1.28 = 0.90 + 0.38).

Likewise, the selection criterion range of residual standard error equals the residual standard error plus (+) and minus (-) three of its standard deviations. The standard deviation of the residual standard error is defined as: $\sigma/\sqrt{2N}$.

As also shown in table 1, the target gas pipeline company has a residual standard error of 3.7867. According to the above formula, the standard deviation of the residual standard error would be 0.1664 (0.1664 = 3.7867/$\sqrt{2(259)}$ = 3 7867/22.7596, where 259 = N, the number of weekly price change observations over a period of five years). Three standard deviations of the target utility's residual standard error would be 0.4992 (0.1664 x 3 = .4992). Consequently, the range of residual standard errors to be used as a selection criterion is 3.2875 - 4.2859 (3.2875 = 3.7867 - 0.4992) and (4.2859 = 3.7867 + 0.4992).

Step Two: The step one criteria are applied to Value Line's data base of nearly 4,000 firms for which Value Line derives unadjusted betas and residual standard errors on a weekly basis. All firms with unadjusted betas and residual standard errors within the criteria ranges are then selected.

Step Three: In the regulatory ratemaking environment, authorized common equity return rates are applied to a book-value rate base. Thus, the earnings rates on book common equity, or net worth, of competitive, non-utility firms are highly relevant provided those firms are indeed comparable in total risk to the target gas pipeline. The use of the return rates of other utilities has no relevance because their allowed, and hence subsequently achieved, earnings rates are dependent upon the regulatory

table 1

Summary of the Comparable Earnings Analysis for the Proxy Group of 248 Non-Utility Companies Comparable in Total Risk to the Target Gas Pipeline Company[1]

	1	2	3	4	5	6	7	8
				rate of return on net worth				
	adj. beta	unadj. beta	residual standard error	3-year average[2]	4-year average[2]	5-year average[2]	5-year projected[3]	
average for the proxy group of 248 non-utility companies comparable in total risk to the target gas pipeline company	0.97	0.92	3.7705					
target gas pipeline company	0.96	0.90[4]	3.7867					
median				11.7%	12.0%	12.6%	15.5%	
average of the median historical returns					12.1%			
conclusion[5]								13.8%

[1] The criteria for selection of the non-utility group was that the non-utility companies be domestic and included in *Value Line Investment Survey*. The non-utility group was selected based on an unadjusted beta range of 0.52 to 1.28 and a residual standard error range of 3.2875 to 4.2859.
[2] Ending 1992.
[3] 1996-1998/1997-1999.
[4] The average standard deviation of the target gas pipeline company's unadjusted beta is 0.1250.
[5] Equal weight given to both the average of the 3-, 4- and 5-year historical medians (12.1%) and 5-year projected median rate of return on net worth (15.5%). Thus, 13.8% = (12.1% + 15.5% / 2).
Source: Value Line Inc., March 15, 1994.
Value Line Investment Survey

Comparable Earnings *from page 6*

process. Consequently, we believe all utilities must be eliminated to avoid circularity. Moreover, we believe non-domestic firms must be eliminated because their reporting methods differ significantly from U.S. firms.

Step Four: We then eliminated those firms for which Value Line does not publish a "Ratings & Report" in *Value Line Investment Survey* so that the historical and projected returns on net worth[6] are from a consistent source. We use historical returns on net worth for the most recent five years, as well as those projected three to five years into the future. We believe it is logical to evaluate both historical and projected return rates because it is reasonable to assume that investors avail themselves of both when they are available from widely disseminated information services, such as Value Line Inc. The use of Value Line's return rates on net worth understates the common equity return rates for two reasons. First, preferred stock is included in net worth. Second, the net worth return rates are as of the end of each period. Thus, the use of average common equity return rates would yield higher results.

Step Five: Median returns based on the historical average three, four and five years ending 1992 and projected 1996-1998 or 1997-1999 rates of return on net worth are then determined as shown in columns 4 through 7 of table 1. The median is used due to the wide variations and skewness in rates of return on net worth for the non-utility firms as evidenced by the frequency distributions of those returns as shown in illustration 1.

However, we show the average unadjusted beta, 0.92, and residual standard error, 3.7705, for the proxy group in columns 2 and 3 of table 1 because their frequency distributions are not significantly skewed, as shown in illustration 2.

Step Six: Our conclusion of a com-

continued on page 8

Illustration 1

Rates of Return on Net Worth for the Proxy Group of 248 Non-Utility Companies[1]

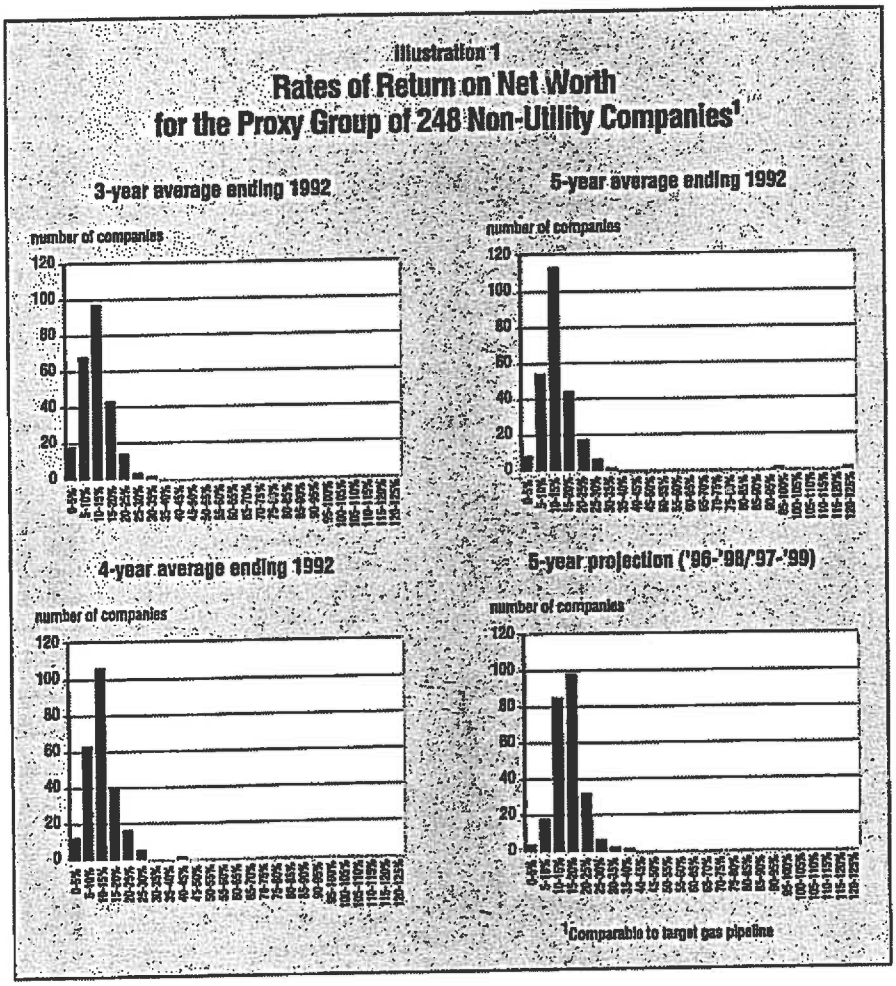
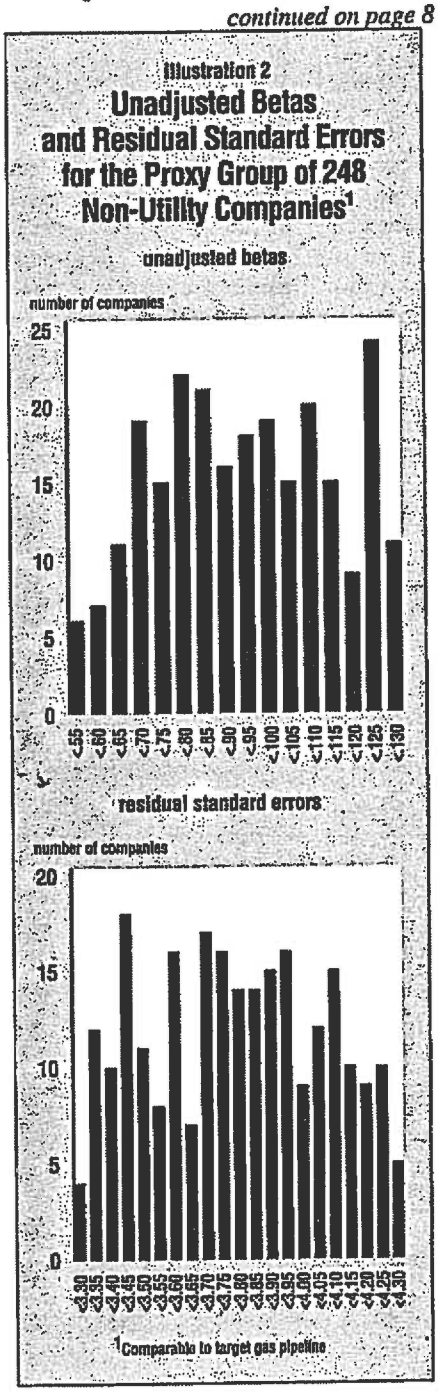


Illustration 2

Unadjusted Betas and Residual Standard Errors for the Proxy Group of 248 Non-Utility Companies[1]



Comparable Earnings *from page 7*

parable earnings cost rate is based upon the mid-point of the average of the median three-, four- and five-year historical rates of return on net worth of 12.1 percent as shown in column 5 and the median projected 1996-1998/1997-1999 rate of return on net worth of 15.5 percent as shown in column 7 of table 1. As shown in column 8, it is 13.8 percent.

Summary

Our comparable earnings approach demonstrates that it is possible to select a proxy group of non-utility firms that is comparable in total risk to a target utility. In our example, the 13.8 percent comparable earnings cost rate is very conservative as it is an expected achieved rate on book common equity (a regulatory allowed rate should be greater) and because it is based on end-of-period net worth. A similar rate on average net worth would be about 20 to 40 basis points higher (i.e., 14.0 to 14.2 percent) and still understate the appropriate regulatory allowed rate of return on book common equity.

Our selection criteria are based upon measures of systematic and unsystematic risk, specifically unadjusted beta and residual standard error. They provide the basis for the objective selection of comparable non-utility firms. Our selection criteria rely on changes in market prices over approximately five years. We compare the aggregate total risk, or the sum of systematic and unsystematic risk, which reflects investors' aggregate assessment of both business and financial risk. Thus, no adjustments are necessary to the proxy group results to compensate for the differences in business risk and financial risk, such as accounting practices and debt/equity ratios. Moreover, it is inappropriate to attempt a comparison of the target utility with any individual firm, or subset of firms, in the proxy group because only the average firm of the group is relevant.

Because the comparable earnings model is firmly anchored in the "corresponding risk" precept established in the landmark court decisions, it is worthy of consideration as a principal model for use in estimating the cost rate of common equity capital of a regulated utility. Our approach to the comparable earnings model produces a proxy group that is indeed comparable in total risk because the selection process is objective and quantitative. It therefore overcomes criticism linked to arbitrary selection processes.

All cost-of-common-equity models, including the DCF and CAPM, are fraught with deficiencies, usually stemming from the many necessary but unrealistic assumptions that underlie them. The effects of the deficiencies of individual models can be mitigated by using more than one model when estimating a utility's common equity cost rate. Therefore, when the non-comparability issue is overcome, the comparable earnings model deserves to receive the same consideration as a primary model, as do the currently popular market-based models. ■

[1] *Bluefield Water Works Improvement Co. v. Public Service Commission*. 262 U S 679 (1922) and *Federal Power Commission v Hope Natural Gas Co.*, 320 U.S 519 (1944).

[2] Charles F. Phillips Jr., The Regulation of Public Utilities: Theory and Practice, Public Utilities Reports Inc., 1988. p 379

[3] James C Bonbright. Albert L. Danielsen and David R Kamerschen. Principles of Public Utilities Rates. 2nd edition. Public Utilities Reports Inc. 1988, p 329.

[4] Jack Clark Francis. Investments: Analysis and Management. 3rd edition. McGraw-Hill Book Co., 1980, p 363.

[5] Id., p. 548.

[6] Returns on net worth must be used when relying on Value Line data because returns on book common equity for non-utility firms are not available from Value Line

Report Lists Pipeline, Storage Projects

More than $9 billion worth of projects to expand the nation's natural gas pipeline network are in various stages of development, according to an A.G.A. report. These projects involve nearly 8,000 miles of new pipelines and capacity additions to existing lines and represent 15.3 billion cubic feet (Bcf) per day of new pipeline capacity.

During 1993 and early 1994, construction on 3,100 miles of pipeline was completed or under way, at a cost of nearly $4 billion, says A.G.A. These projects are adding 5.4 Bcf in daily delivery capacity nationwide.

Among the projects completed in 1993 were Pacific Gas Transmission Co.'s 805 miles of looping that allows increased deliveries of Canadian gas to the West Coast; Northwest Pipeline Corp.'s addition of 433 million cubic feet of daily capacity for customers in the Pacific Northwest and Rocky Mountain areas; and the 156-mile Empire State Pipeline in New York.

In addition, major construction projects were started on the systems of Texas Eastern Transmission Corp. and Algonquin Gas Transmission Co. — both subsidiaries of Panhandle Eastern Corp. — and along Florida Gas Transmission Co.'s pipeline.

The report goes on to discuss another $5 billion in proposed projects, which, if completed, will add nearly 5,000 miles of pipeline and 9.8 Bcf per day in capacity, much of it serving Florida and West Coast markets.

A.G.A. also identifies 47 storage projects and says that if all of them are built, existing storage capacity will increase by more than 500 Bcf, or 15 percent.

For a copy of *New Pipeline Construction: Status Report 1993-94* (#F00103), call A.G.A. at (703) 841-8490. Price per copy is $6 for employees of member companies and associates and $12 for other customers.

Carolina Water Service, Inc.
Selection of Non-Price Regulated Group Similar in Risk to
Dr. Carlisle's Water Proxy Group

Dr. Carlisle's Water Proxy Group

Ticker	Company Name	Unadjusted Beta	Standard Error of the Regression
AWR	Amer. States Water	0.56	2.7946
AWK	Amer. Water Works	0.42	1.9373
WTR	Aqua America	0.50	2.1431
ARTNA	Artesian Res Corp	0.37	2.9852
CWT	California Water	0.58	2.4397
CTWS	Conn. Water Services	0.45	2.5093
GWRS	Global Water Resourc	NA	NA
MSEX	Middlesex Water	0.56	2.6567
SJW	SJW Group	0.55	2.8737
YORW	York Water Co. (The)	0.58	2.8013
	Range Unadjusted Beta	0.37	0.58
	Range Standard Error of Regression	1.9373	2.9852

Comparable Risk Non-Price Regulated Group

Ticker	Company Name	Unadjusted Beta	Standard Error of the Regression
AZO	AutoZone Inc.	0.55	2.2083
CBOE	CBOE Holdings	0.49	2.5086
CPB	Campbell Soup	0.49	2.1673
DNKN	Dunkin' Brands Group	0.53	2.8822
DPS	Dr Pepper Snapple	0.55	1.9555
FORR	Forrester Research	0.58	2.7464
HRL	Hormel Foods	0.57	2.2989
HSY	Hershey Co.	0.49	2.2615
KMB	Kimberly-Clark	0.50	1.9767
MCY	Mercury General	0.52	2.4935
SJM	Smucker (J.M.)	0.50	2.1906
WMT	Wal-Mart Stores	0.43	2.1287

NA = Not Available

Source of Information:
Value Line Proprietary Database December 2017

Carolina Water Service, Inc.
Summary of Cost of Common Equity Models
Applied to Dr. Carlisle's Non-Price Regulated Group

Principal Methods	Dr. Carlisle's Non-Price Regulated Group
Discounted Cash Flow Model (DCF) (1)	14.66%
Capital Asset Pricing Model (CAPM) (2)	9.85%
Average	12.26%

Notes:
(1) From page 2 of this Schedule.
(2) From page 3 of this Schedule.

Carolina Water Service, Inc.
Indicated DCF Cost Rate for Dr. Carlisle's Non-Price Regulated Group

	VL Projected EPS Growth 2017	Estimate	Growth	Zacks LT EPS Growth	Yahoo! Finance LT EPS Growth	Dividend Yield
AutoZone, Inc.	$ 44.07	$ 78.00	17.72%	12.70%	11.68%	NA
CBOE Holdings, Inc.	2.40	5.75	28.36%	17.60%	17.90%	0.90%
Campbell Soup Company	3.04	3.50	4.11%	5.30%	3.75%	3.00%
Dunkin' Brands Group, Inc.	2.43	4.50	19.25%	13.40%	13.86%	2.40%
Dr. Pepper Snapple Group	4.50	6.20	9.59%	10.70%	10.64%	2.50%
Forrester Research, Inc.	1.22	2.00	15.17%	12.00%	12.00%	2.00%
Hormel Foods Corporation	1.57	2.50	14.22%	9.30%	0.53%	2.10%
The Hershey Company	4.85	6.45	8.49%	8.70%	9.62%	2.30%
Kimberly-Clark	6.20	7.75	6.58%	7.90%	7.61%	3.30%
Mercury General	1.63	5.00	37.75%	25.30%	25.30%	5.40%
The J.M. Smucker Co.	7.00	9.40	8.79%	7.90%	10.10%	2.50%
Wal-Mart Stores, Inc.	4.43	6.50	11.58%	5.80%	7.10%	2.10%
		Mean	15.13%	11.38%	10.84%	2.59%
		Median	12.90%	10.00%	10.37%	
		Average	14.01%	10.69%	10.61%	

Growth (1)	11.77%
Dividend Yield	2.59%
Dividend Growth (2)	0.30%
Indicated DCF Cost of Equity	14.66%

NA = Not Available

Sources of Information:
Value Line Investment Survey
Zacks Investment Service
Yahoo! Finance

Carolina Water Service, Inc.
Indicated CAPM Cost Rate for
Dr. Carlisle's Non-Price Regulated Group

Line No.		
1.	Market Return (1)	11.80%
2.	Risk-Free Rate (2)	3.70%
3.	Equity Risk Premium (3)	8.10%
4.	Beta (4)	0.725
5.	CAPM Cost of Equity (5)	9.57%
6.	ECAPM Cost of Equity (6)	10.13%
7.	Average	9.85%

Notes:
(1) From page 7-13 of SBBI - 2017.
(2) From Revised Exhibit DHC-2.
(3) Line 1 - Line 2.
(4) From page 4 of this Schedule.
(5) Line 2 + (Line 3 x Line 4).
(6) Line 2 + (0.75 x (Line 3 x Line 4)) + (0.25 x Line 3).

Carolina Water Service, Inc.
Beta Coefficients for Dr. Carlisle's
Non-Price Regulated Group

Company Name	Beta
AutoZone, Inc.	0.80
CBOE Holdings, Inc.	0.70
Campbell Soup Company	0.70
Dunkin' Brands Group, Inc.	0.60
Dr. Pepper Snapple Group	0.75
Forrester Research, Inc.	0.70
Hormel Foods Corporation	0.75
The Hershey Company	0.75
Kimberly-Clark	0.75
Mercury General	0.80
The J.M. Smucker Co.	0.70
Wal-Mart Stores, Inc.	0.70
Average	0.725

Source of Information
Value Line Investment Survey - Standard Edition